

AMENDMENTS TO THE CLAIMS:

The following listing of claims replaces all prior versions and listings of claims in this application.

LISTING OF CLAIMS:

Claims 1-15. (Cancelled)

16. (Currently Amended) A specified pattern detection apparatus comprising:

a plurality of filters provided for detecting an image of a specified pattern at a first pixel resolution;

an extractor which extracts a specified pattern included in the image of the specified pattern with use of a combination of filters in said plurality of filters to determine a position and rotation of the specified pattern;

a circuit for generating an image of the specified pattern at a resolution lower than the first resolution; and

a calculator which determines the position of the image of the specified pattern more precisely than said extractor, based on the position and rotation determined by said extractor and the lower resolution image; and

wherein each filter performs detection in a partial area of the image, the specified pattern being detected when a preset combination of filters detects a portion of the pattern.

17. (Currently Amended) A specified pattern detection apparatus comprising:

a plurality of filters provided for detection of an image of a specified pattern;

an extractor which extracts a specified pattern included in the image of the specified pattern with use of a combination of filters in said plurality of filters to determine a position of the specified pattern;

a calculator which determines the position of the specified pattern more precisely than said extractor, based on the position determined by said extractor;

a binarizer which binarizes input image data to provide bi-level image data;

an image extractor which extracts specified partial images included in the image of the specified pattern, in the bi-level image data obtained by said binarizer; and

a reduced image generator which generates a reduced image of an image including the specified partial images, the reduced image having a lower resolution than the image including the specified partial images;

wherein said extractor extracts the specified pattern included in the reduced image generated by said reduced image generator; and

wherein each filter performs detection in a partial area of the image, the specified pattern being detected when a preset combination of filters detects a portion of the pattern.

18. (Previously Presented) The specified pattern detection apparatus according to claim 16, wherein the filters in the combination of filters are positioned along a circumferential line.

19. (Previously Presented) The specified pattern detection apparatus according to claim 17, wherein the filters in the combination of filters are positioned along a circumferential line.

20. (Previously Presented) The specified pattern detection apparatus according to claim 16, wherein the plurality of filters are provided for extracting images of a plurality of types of specified patterns.

21. (Previously Presented) The specified pattern detection apparatus according to claim 17, wherein the plurality of filters are provided for extracting images of a plurality of types of specified patterns.

22. (Currently Amended) A method for detecting a specified pattern comprising the steps of:

extracting a specified pattern included in an image of a specified pattern of a first resolution with use of a combination of filters in a plurality of filters provided for image detection and determining a position and rotation of the specified pattern;

generating an image at a resolution lower than the first resolution of the image of the specified pattern; ~~and~~

further determining the position of the specified pattern more precisely based on the determined position and rotation of the lower resolution image; and

performing detection in a partial area of the image with each filter, and
detecting the specified pattern when a preset combination of filters detect a portion
of the pattern.

23. (Currently Amended) A method for detecting a specified pattern comprising the steps of:

extracting a specified pattern included in an image of the specified pattern with use of a combination of filters in a plurality of filters provided for image detection and determining a position of the specified pattern;

further determining the position of the specified pattern more precisely based on the determined position;

binarizing input image data to provide bi-level image data;

extracting specified partial images in the bi-level image data; and

generating a reduced image of an image including the specified partial images, the reduced image having a lower resolution than the image including the specified partial images;

wherein the specified pattern is extracted in the reduced image; and

wherein each filter performs detection in a partial area of the image, the
specified pattern being detected when a preset combination of filters detects a
portion of the pattern.

24. (Previously Presented) A specified pattern detection apparatus comprising:

a binarizer which binarizes input image data to provide bi-level image data;

a storage device which stores the bi-level image data obtained by said binarizer;

a partial image extractor which extracts specified partial images in the bi-level image stored in said storage device with a filter for conversion;

a gain calculator which calculates and stores information for each pixel in the bi-level image, in which the specified partial images are extracted, with a gain filter, the information representing a distance from the each pixel to the specified partial image;

a position calculator which calculates ideal positions of the partial images to be included in a specified pattern; and

a gain output device which outputs a gain on the ideal positions based on the information obtained and stored by said gain calculator; and

filters that each perform detection in a partial area of the image, the specified pattern being detected when a preset combination of the filters detects a portion of the pattern.

25. (Previously Presented) The specified pattern detection apparatus according to claim 24, wherein said conversion filter converts the partial image stored in said storage device to 1-bit data.

26. (Currently Amended) A method for detecting a specified pattern comprising the steps of:

binarizing input image data to provide bi-level image data;

storing the bi-level image data;

extracting specified partial images in the bi-level image stored with a filter for conversion;

calculating and storing information for each pixel in the bi-level image, in which the specified partial images are extracted, with a gain filter, the information representing a distance from the each pixel to the specified partial image;

calculating ideal positions of the partial images;

outputting a gain on the calculated ideal positions based on the information obtained by said gain calculator; and

performing detection in a partial area of the image with filters, and detecting the specified pattern when a preset combination of the filters detects a portion of the pattern.

27. (Canceled)

28. (Canceled)

29. (Canceled)